SD Series

All-digital AC servo system

User manual

Hangzhou Bergerda Automation Technology.Co.,LTD

Installation/debugging/please read this manual carefully before using the product

Thank you for choosing SD series servo driver system and servo motor. Please read this manual before using, the main contents of this manual include:

* Servo driver inspection, installation and wiring steps.
* Digital panel operation steps, status display, trouble alarm and processing.
* Servo system control mode, trial running and adjustment steps.
* List of all the parameters in the servo drives.
* Servo drives specifications.

In order to facilitate the daily inspection, maintenance, and find the reasons and countermeasures of the exceptions, please keep this manual for ready reference.

Note: Please give this manual to the end user so as to maximize utility of the servo drives.

● The manual contents may be changed due to the product improvements, there will be no prior notice.

● Any changes made to the product by end users, the company will not bear any responsibility and the product warranty will be invalid.

When reading this manual, please pay special attention to the following warning signs

Indicate the wrong operation may cause disastrous consequences—death or serious injury!

Indicate the wrong operation may hurt the operator and also make damage to the equipment!

Improper use may damage the product and equipment!

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Chapter 1 Product inspection and installation

1.1 Product inspection

The servo products have done a complete functional test before leave factory, in order to prevent the product exception in the process of shipment, please check the following items carefully when open the package:

1) Check the servo drive and motor model whether is the same as ordered. (model description please refer to the following chapters)

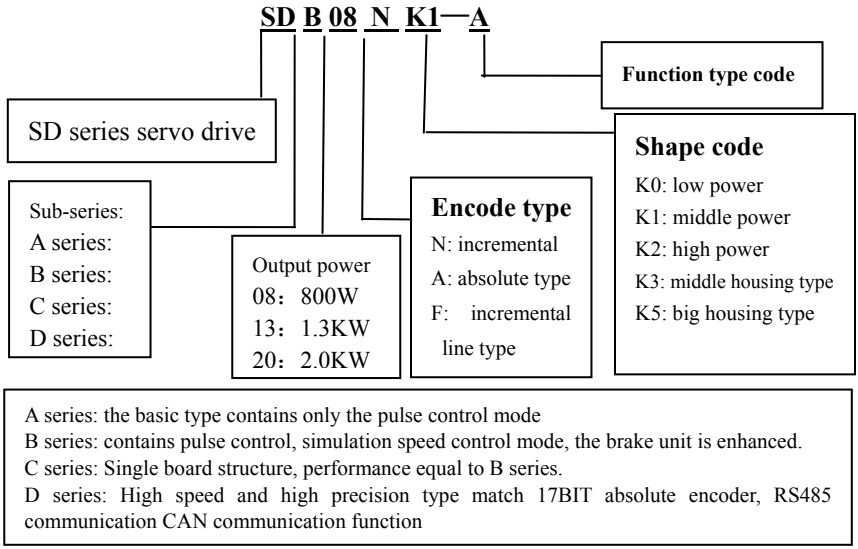
2) Check the servo drive and motor appearance whether with damage or scratch. (If there is any damage during transportation, please do not connect wire and give power!)

3) Check the servo motor rotor spindle whether rotated smoothly by hand. (the mechanical brake servo motor can not be rotated directly!)

If there is any above mentioned failures or abnormal signs, please contact local distributors immediately.

1.1.1 Model confirmation

Servo drive model


SD B 08 N K1—A
Function type code
SD series servo drive
Shape code
K0: low power
K1: middle power
K2: high power
K3: middle housing type
K5: big housing type
Sub-series:
A series:
B series:
C series:
D series:
Output power
08：800W
13：1.3KW
20：2.0KW
Encode type
N: incremental
A: absolute type
F: incremental line type
A series: the basic type contains only the pulse control mode
B series: contains pulse control, simulation speed control mode, the brake unit is enhanced.
C series: Single board structure, performance equal to B series.
D series: High speed and high precision type match 17BIT absolute encoder, RS485 communication CAN communication function

1.1.2 SD servo drive random standard accessories

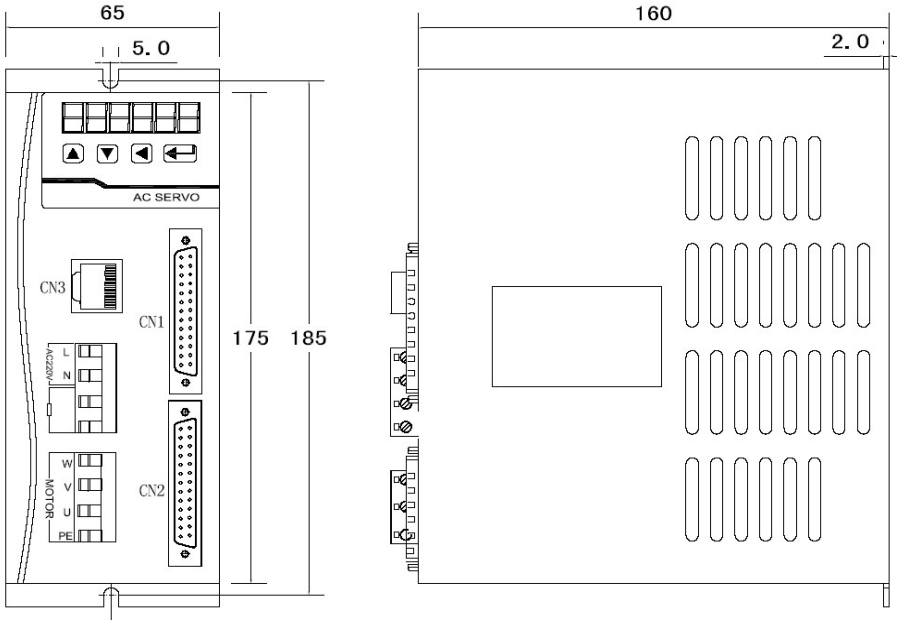
① CN1 plug (DB25 hole) 1 set

② CN2 plug（DB25 pin） 1 set

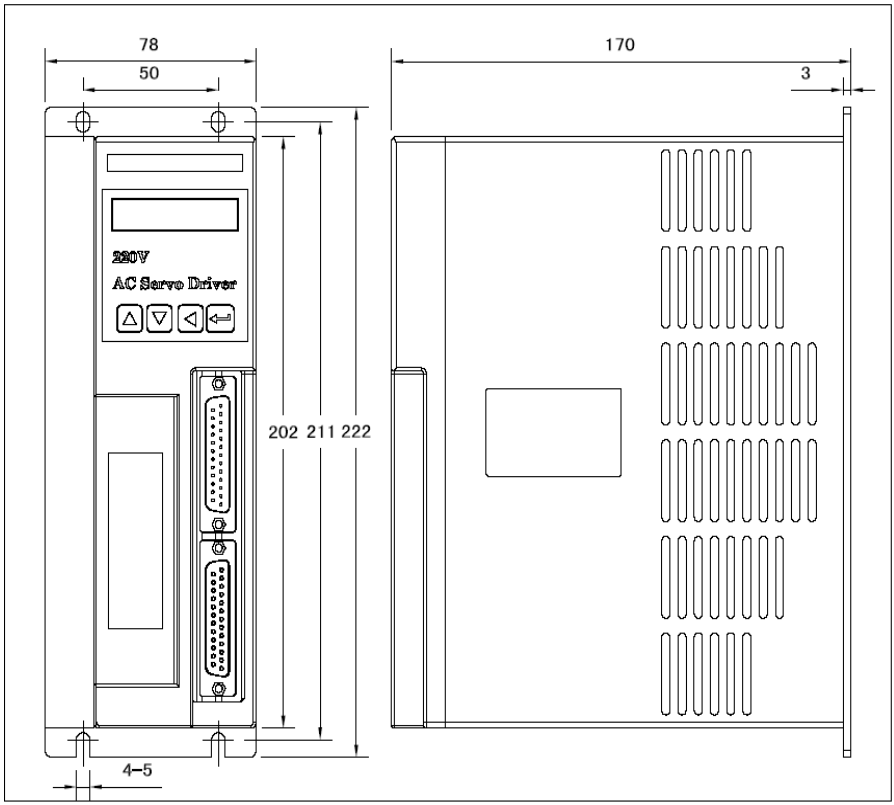
③ 4 position black power plug（SD*08NK0 drive）1 piece

④ 4 position green power plug（SD*08NK0 drive）1 piece

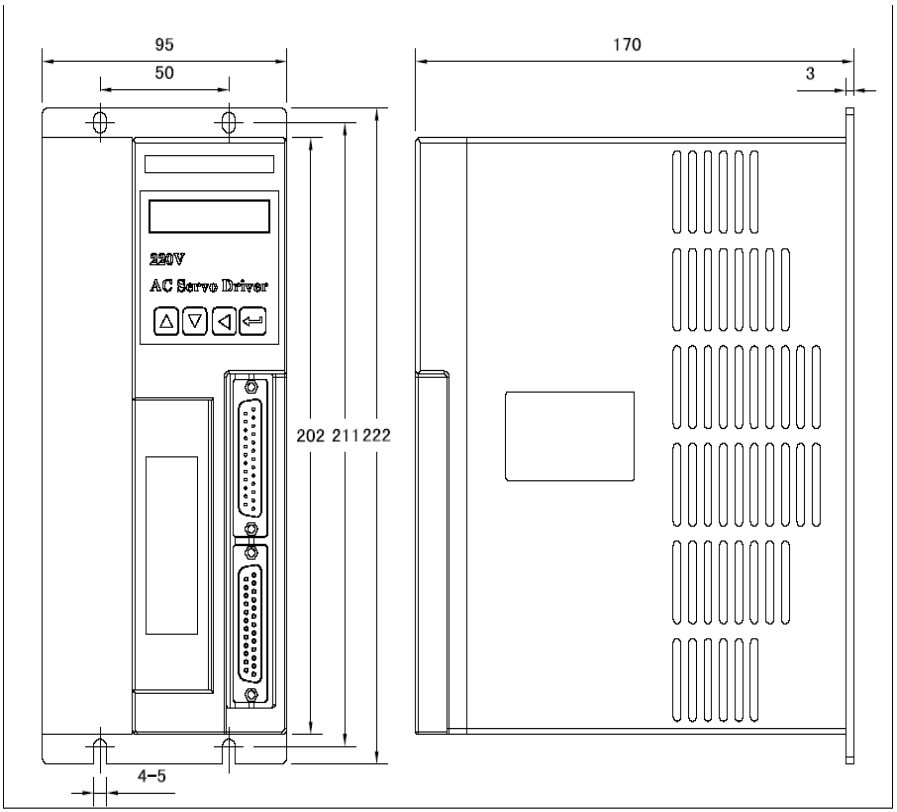
1.1.3 Servo drive installation size



!!!!Notice: L N is 220V power input terminal, P D is external braking resistor terminals. It can not be connected wrong. SD*08NK0 servo drive installation dimensions chart



SD*13NK3 and SD*20NK3 servo drive installation dimensions chart



SD*50NK5 servo drive installation chart

1．2 Servo drive specifications

1.2.1 SD drive specifications

Basic specifications	model		SD*08	SD*13	SD*20		SD*50
	Current rating(A)		4.5	5.5	9.5		18.0
	input power		single phase or three phase AC170~253V				
			50/60Hz				
	Cooling method		Natural cooling				
	Control method		SVPWM control				
	Encoder		Incremental				
Internal functions	display and operation		Six seven-segment display LED: four function keys				
	Control mode		position control/analog voltage speed control/speed trial run/jog run				
	Braking function		Internally installed				
	Protection function		Undervoltage, overvoltage, excess load, excess current, encoder exception, braking, position error etc.				
position control mode	Instruction control mode		External pulse				
Position control mode	Instruction control mode		External pulse				
	External command pulse input	form	pulse+ direction dipulse orthogonal pulse				
		Maximum frequency	Differential motion: 500KHZ open collector: 200KHZ				
	Electronic gear ratio		1～32767/1～32767				
	Instruction smooth way		Smoothing time constant 0～2 sec				
Speed control mode	External analog voltage	Voltage range	±10V				
		Input impedance	10K				
	Speed control range		Speed ratio: 1:5000				
	Speed rage of change		Speed fluctuation ratio: ＜±0.03 （load 0～100%）. ＜±0.05（power-15%～+10%）				
	Instruction smooth way		Linear time constant 1 ms～10000ms（0r/min←→1000r/min）				
	frequency characteristic		300HZ				
input /	location signal output	output type	ABZ line drive output/ Z open collector output				
		Frequency	1/255/～1				

output signal		dividing ratio	
	input signal	4 photoelectric isolated input	1)servo enable 2)alarm clear 3)deviation counter reset/speed option1 4)command pulse prohibited/ speed option 2
	output signal	4 open collector	1)location/speed reach 2)servo alarm output；3)Z signal output 4)brake output
Usage temperature			Operation:0℃～55℃ storage:-20℃～80℃

1.3 Servo drive installation

1.3.1 Installation environment conditions

Servo drive installation environment has a direct effect to the normal function and service life of the drive, therefore, the drive installation environment must meet following conditions:

Items	SD servo drive
usage temperature/ humidity	0℃～55℃（no frozen frost） 90%RH below（no condensation）
storage temperature/ humidity	-20℃～80℃ 90%RH（no condensation）
atmospheric environment	In control cabinet, no corrosive gas, inflammable gas, oil mist or dust etc
vibration	less than 0.5G（4.9m/s^2）10 Hz -60Hz（not run continuously）
Protection level	IP54

When several drives installed in the control cabinet, please note the locating place and keep enough space for sufficient heat dissipation; please add an additional cooling fan to keep the drive ambient temperature below 55 ℃.

Please install the drive by vertical way, face forward, top up for heat dissipation.

Avoid any drilling cuttings or other things falling in the drive during assembly.

Please use M4 screws when installing.

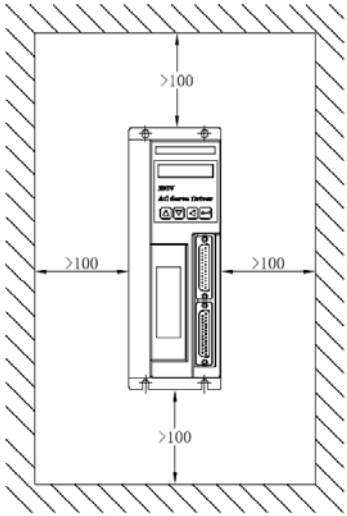
If there is vibration source (punch) nearby and can not avoid it, please use vibration absorber or add anti-vibration rubber gasket.

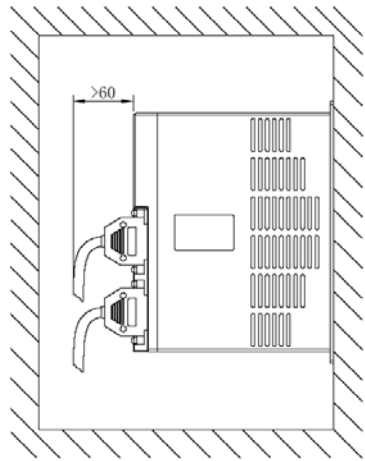
If there is a large magnetic switch, welding machine etc noise interference sources nearby, the drive is easily interfered by outside and make wrong action, therefore, a noise filter must be added; but the noise filter will increase leak current, so, an insulating

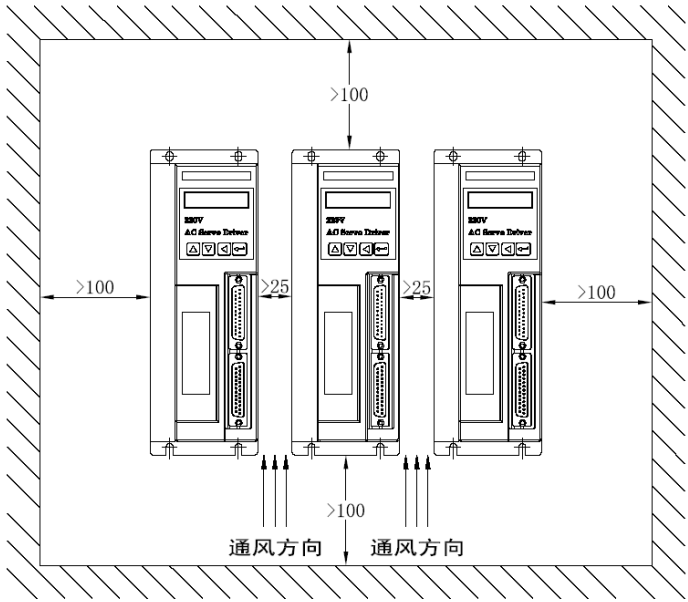
transformer must be installed at the input end of the drive.

1.3.2 Servo installation direction and interval

Below chart shows a single drive and multiple drive installation interval, the interval should be larger enough for a good heat dissipation conditions.

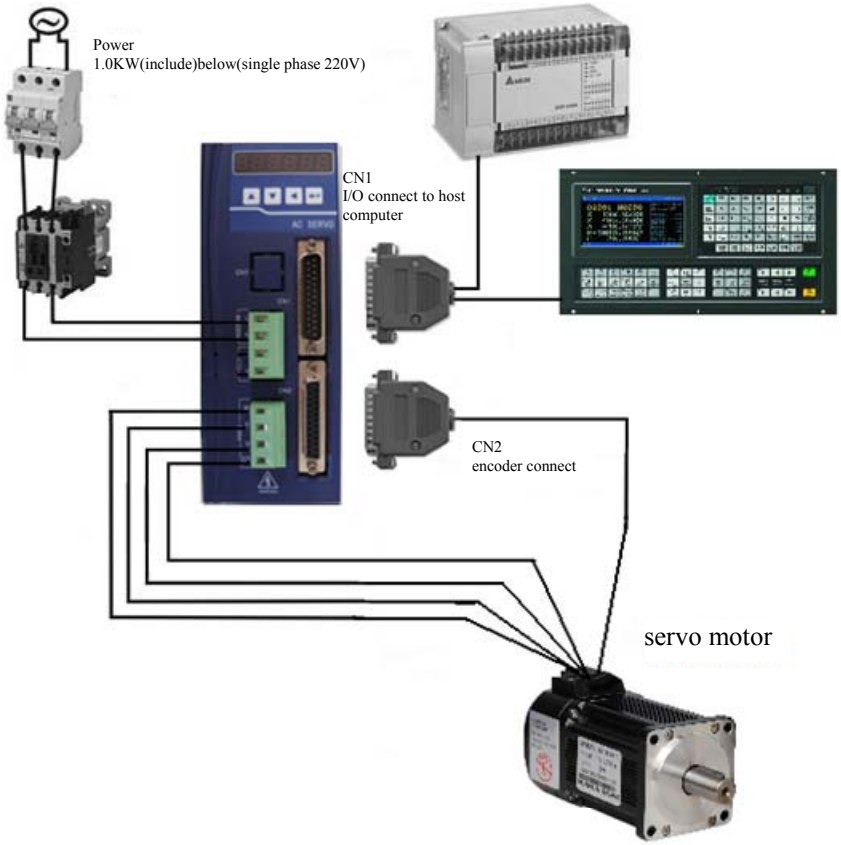




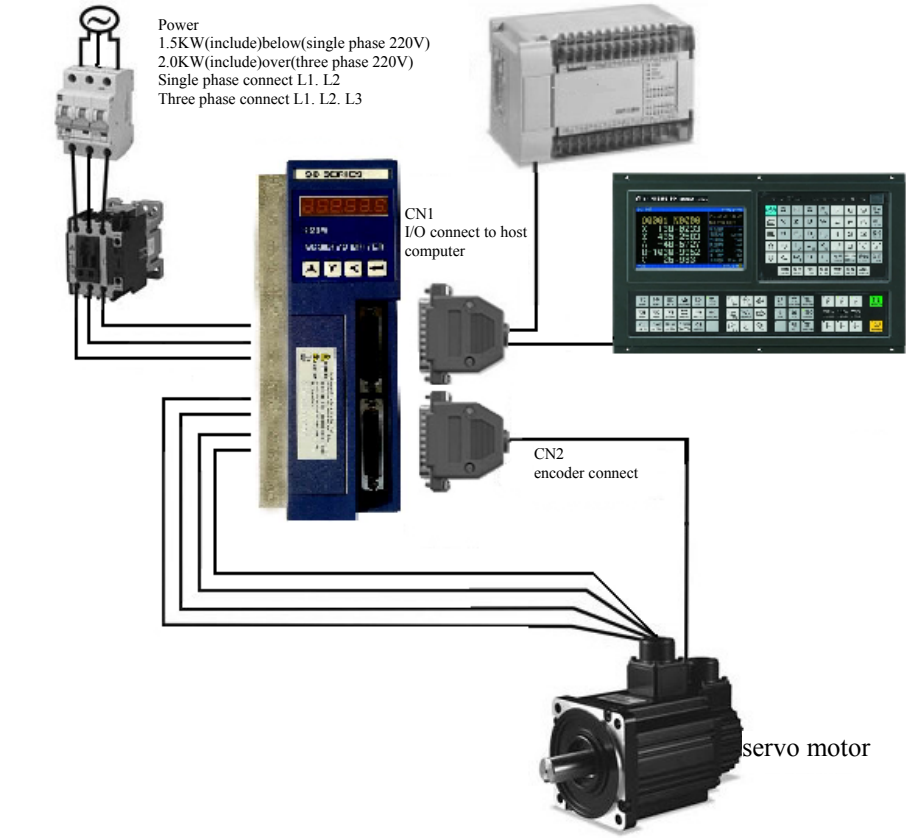


Chapter 2 Servo drive and motor wiring

2.1 Servo drive power supply and peripheral devices wiring

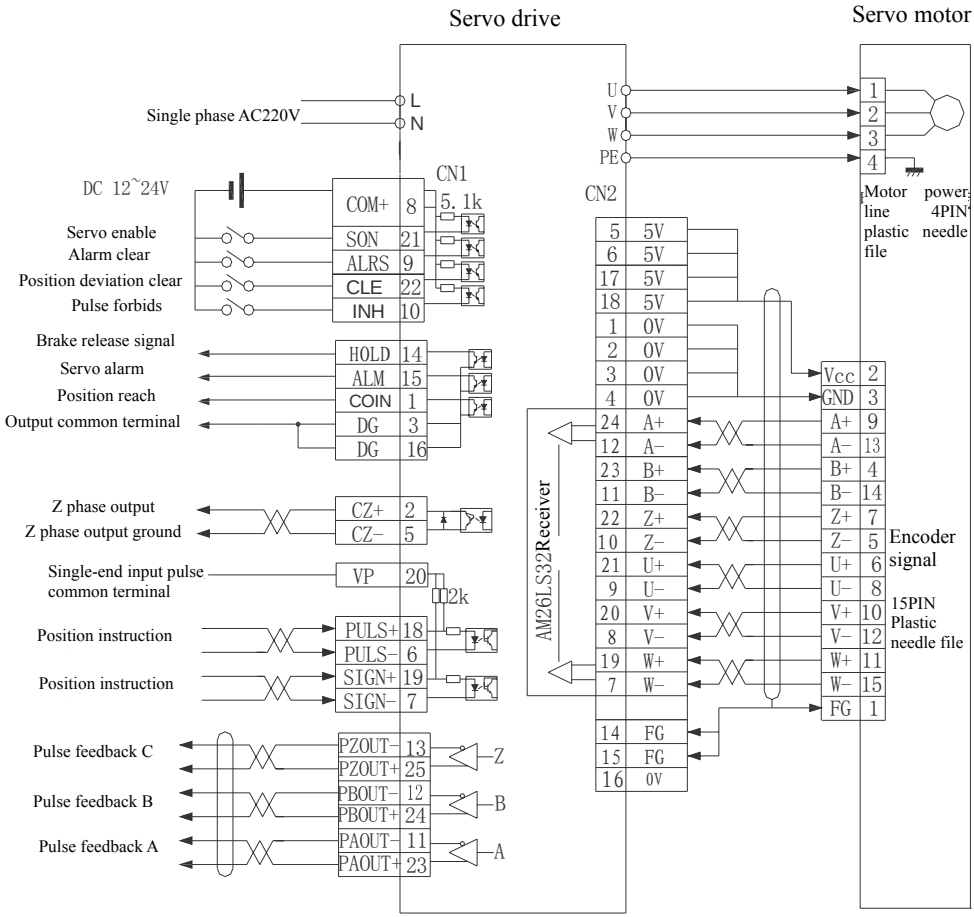


SD*08NK0 servo drive peripheral devices wiring

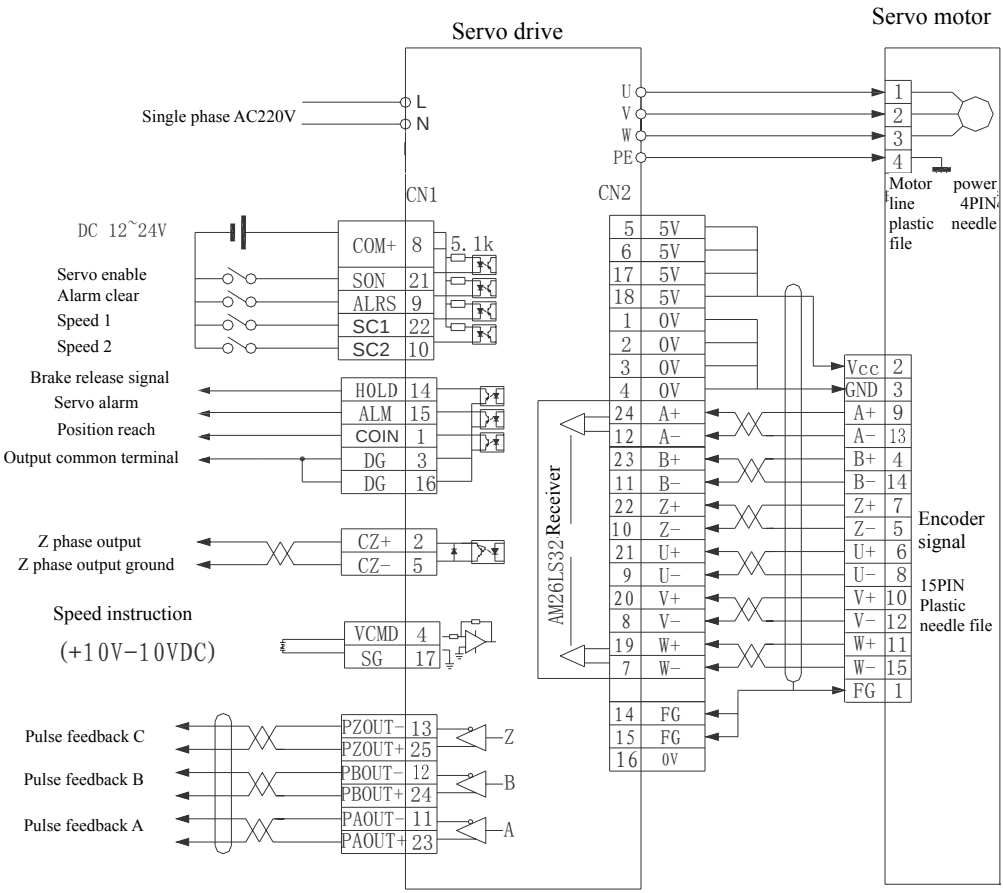


SD*13NK3/SD*20NK3/SD*50NK5 series servo drive peripheral devices wiring

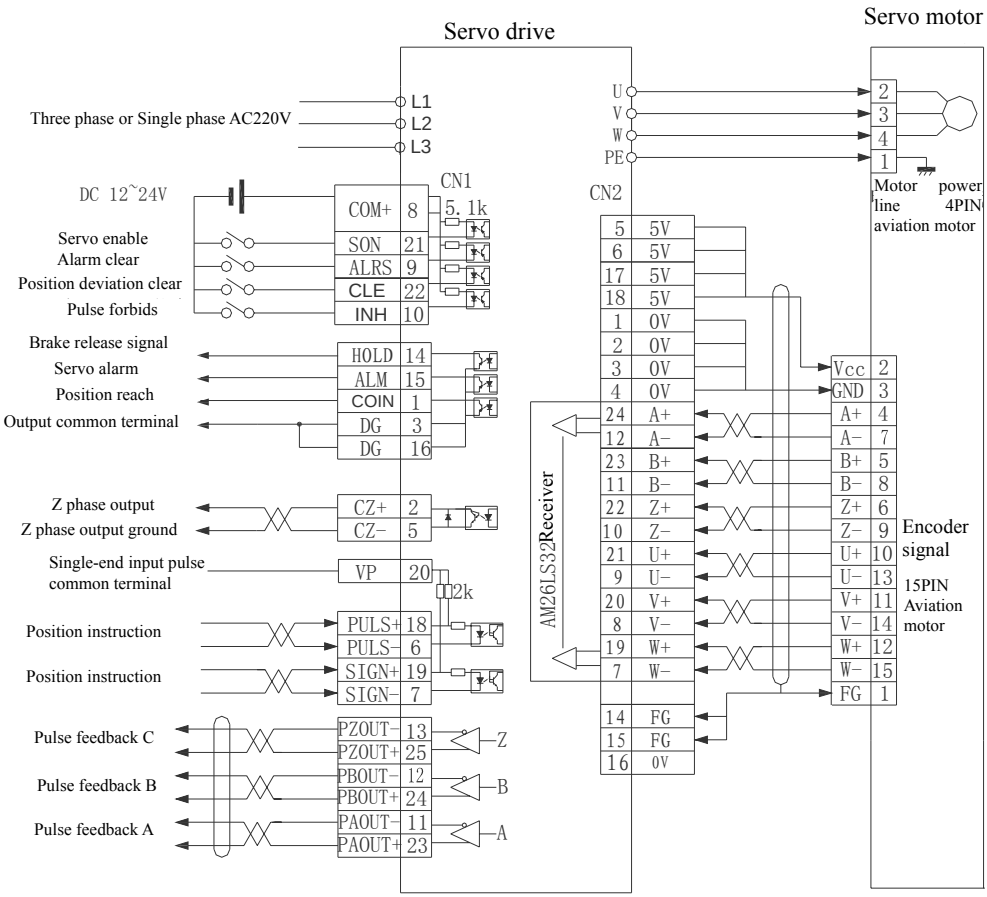
2.2Position/speed control mode wiring diagram



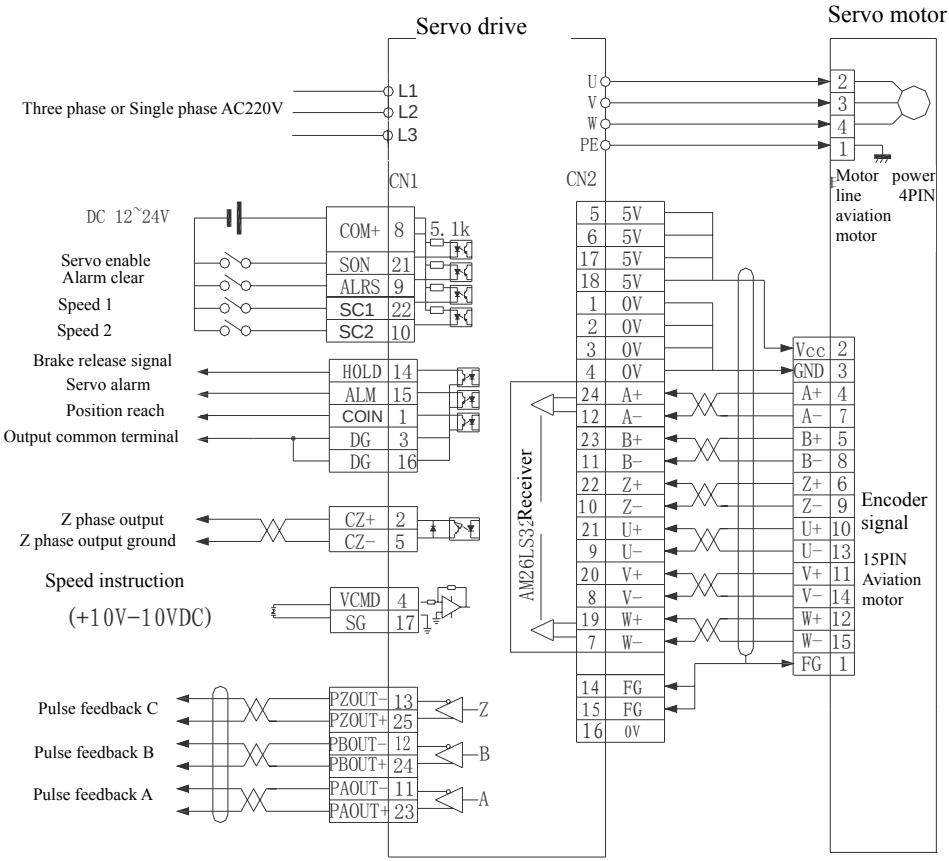
SD*08NK0 position control mode wiring diagram



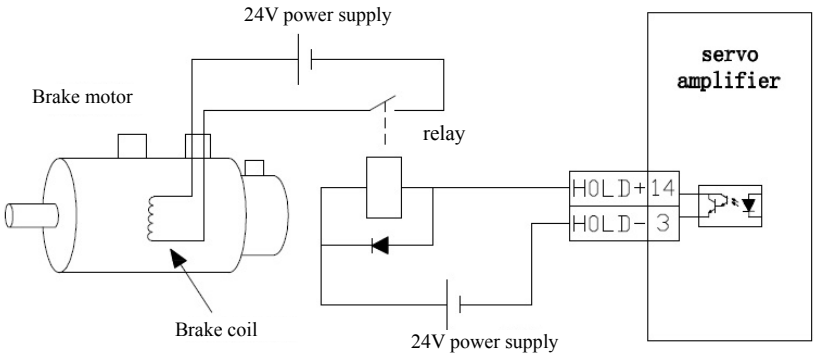
SD*08NK0 speed control mode wiring diagram



SD*13NK3/ SD*20NK3 / SD*50NK5 position control mode wiring diagram



SD*13NK3/ SD*20NK3 / SD*50NK5 speed control wiring diagram



HOLD±Brake release signal typical example

locking type brake electromotor wiring diagram

2.3 Terminal electrical connection

2.3．1、Definition of the power terminal(SD*08*K0 series)

	Terminal marking	signal definition	function
	L	main circuit power single-phase	main circuit power input terminal～220V 50Hz note: do not connect motor output terminal U, V, W.
	N		
	P	external connect brake resistor	use in the situations that start and stop frequently or large inertia load
	D	external connect brake resistor	use in the situations that start and stop frequently or large inertia load
	PE	System grounding	grounding terminal resistance＜100Ω; Servo motor output and power input one public point grounding
	W	Servo motor output	Servo motor output terminals must connect with motor W,V,U terminals
	V		
	U		

2、Power terminal definition(SD*K3/K5 series)**

	Terminal marking	signal definition	function
	L1	main circuit power single-phase or three phase	main circuit power input terminal ～220V 50Hz, single phase connect L1 L2 note: do not connect motor output terminal U, V, W.
	L2		
	L3		
	PE	System grounding	grounding terminal resistance＜100Ω; Servo motor output and power input one public point grounding
	U	Servo motor output	Servo motor output terminals must connect with motor W,V,U terminals
	V		
	W		

2.3．2 Power line terminals wiring

- L1, L2, L3, PE, U, V, W terminal, transversal area≥1.5mm^2 (AWG14-16).
- L, N terminal, transversal area≥1.0 mm^2 (AWG16-18).
- Grounding: the grounding wire should be as thick as possible, drive and servo motor grounding at PE terminal, grounding resistance＜100Ω.
- Suggest providing power supply by three-phase isolating transformer to reduce the possibility of electric shock hurts.
- Suggest providing power supply by the noise filter to improve the anti-interference ability.

Please install non fuse type(NFB) circuit breakers, so that the external power supply can be cut off promptly when the drive with failure.

2.3．3 Signal terminal definition

SD servo drive unit interface terminal configuration as follows. CN1 signal control terminal is DB25 connector, the socket is pin type, plug is hole type; CN2 terminal feeder is DB25 connector, socket is hole type, plug is pin type.

Control terminal CN1

Control mode abbreviation: (P stands for position control mode; S stand for speed control mode)

Terminal No	signal name	mark	I/O	control mode	function
CN1-8	positive power supply of input terminal	COM+	power supply	S/P	positive power supply of input terminal Photoelectric coupler used for drive the input terminals DC12～24V, current≥100mA
CN1-20	Pulse common	VP	Pulse common	S/P	input pulse common power supply side（only when use single end pulse can be used, like PLC）this pin use is prohibited when using the differential input pulse signal, otherwise the product will be damaged.
CN1-21	SRV-ON	SON	input	S/P	the servo enable to input terminals, SON ON: allow the drive to work. SON OFF: drive off, stop working, the motor in free state.
CN1-9	Alarm clear	ALRS	input	S/P	Alarm clear input terminals ALRS ON: remove the system alarm ALRS OFF: keep the system alarm
CN1-22	deviation counter reset	CLE	input	P	position deviation counter reset input terminal CLE ON: position control, position deviation counter reset
	speed choice 1	SC1	input	S	Speed choice 1 input terminal, in the mode of speed control, SC1 and SC2 combinations used to select different internal speed SC1 OFF, SC2 OFF: internal speed 1. SC1 ON，SC2 OFF: internal speed 2. SC1 OFF，SC2 ON: internal speed 3. SC1 ON， SC2 ON: internal speed 4. Note: the value of internal speed 1~4 can be modified by parameters.
CN1-10	Instruction pulse prohibited	INH	input	P	position instruction pulse prohibit input terminals INH ON: instruction pulse input prohibited INH OFF: Instruction pulse input effective
	Speed choice 2	SC2	input	S	Speed choice 2 input terminal, in speed control mode，SC1 and SC2 combinations used to select different internal speed SC1 OFF, SC2 OFF:

					internal speed 1. SC1 ON: SC2 OFF: internal speed 2. SC1 OFF, SC2 ON: internal speed 3. SC1 ON, SC2 ON: internal speed 4.
CN1-1	position/ speed reach	COIN	output	S/P	position speed reach signal output terminals when the servo location close to the target position（Pn12 parameter value）, output ON
CN1-15	servo alarm output	ALM	output	S/P	servo alarm output terminals ALM ON: servo drive without alarm, servo alarm output ON. ALM OFF: servo drive with alarm, servo alarm output OFF.
CN1-3/16	common terminal of the output terminal	DG	common terminal	S/P	Grounding common terminal of the control signal output terminal(except CZ)
CN1-2	encoder Z phase output	CZ	output	S/P	the encoder Z phase output terminals photoelectric code of the servo motor Z phase pulse output CZ ON: Z phase signal appear
CN1-5	encoder Z phase	CZCOM	output	S/P	encoder Z phase output the common terminal of the output terminal
CN1-18	instruction pulse signal	PULS+	input	P	external instruction pulse input terminals Note 1: the parameter Pn8 set pulse input mode; 1．Instruction pulse+symbol mode; 2．CCW/CW instruction pulse mode;
CN1-6		PULS-			
CN1-19	instruction direction signal	SIGN+	input	P	
CN1-7		SIGN-			
CN1-4	analog voltage signal	VCMD	input	S	input analog voltage ±10V input impedance 20K
CN1-17	Analog voltage	SG		S	
CN1-14	brake output positive end	HOLD+	output	S/P	drain open circuit output, normal working, optical coupling breakover. output ON no enabled, drive prohibited. Alarm, optical coupling close; output OFF
CN1-3	brake output	HOLD-		S/P	

	negative end				
CN1-23	encoder pulse A+	PAOUT+	output	S/P	encoder give a feedback of output signal, standard is 2500/wire it can via output Pn41, Pn42 electronic gear to adjust output, example: encoder 2500 pulse each circle, set Pn41/Pn42=4/5, from the drive unit output A, B phase signal is 2500 XPn41/Pn42=2000 pulse/circle
CN1-11	encoder pulse A-	PAOUT-		S/P	
CN1-24	encoder pulse B+	PBOUT+		S/P	
CN1-12	encoder pulse B-	PBOUT-		S/P	
CN1-25	encoder pulse Z+	PZOUT+		S/P	the motor rotate a circle, output a pulse
CN1-13	encoder pulse Z-	PZOUT-		S/P	
CN1-PE	shield	PE			

2) The feedback signal terminal CN2

terminal No	signal name	terminal mark			color	function
		mark	I/O	method		
CN2-5-6-17-18	power output+	+5V	power	S/P		Servo motor photoelectric encoder use＋5V power supply; When the cable is long, should use multiple cores in parallel
CN2-1-2-3-4	power output-	OV	land	S/P		
CN2-24	encoder A＋ input	A+	I	S/P		connect with servo motor photoelectric encoder A+
CN2-12	encoder A－ input	A-				connect with servo motor photoelectric encoder A-
CN2-23	encoder B＋ input	B+	I	S/P		connect with servo motor photoelectric encoder B＋
CN2-11	encoder B－ input	B-				connect with servo motor photoelectric encoder B－
CN2-22	encoder Z＋ input	Z+	I	S/P		connect with servo motor photoelectric encoder Z＋
CN2-10	encoder Z－ input	Z-				connect with servo motor photoelectric encoder Z－
CN2-21	encoder U＋ input	U+	I	S/P		connect with servo motor photoelectric encoder U＋
CN2-9	encoder U－ input	U-				connect with servo motor photoelectric encoder U－

CN2-20	encoder V＋ input	V+	I	S/P		connect with servo motor photoelectric encoder V＋
CN2-8	encoder V－ input	V-				connect with servo motor photoelectric encoder V－
CN2-19	encoder W＋ input	W+	I	S/P		connect with servo motor photoelectric encoder W＋
CN2-7	encoder W－ input	W-				connect with servo motor photoelectric encoder W－
CN2-14	PE					shield

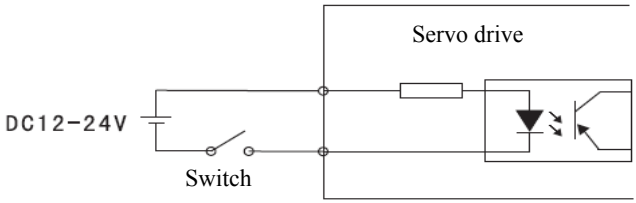
2.3．4 signal terminals cabling

- Cable selection: use shield cable (It is better to choose twisted shielded cable): wire core cross-sectional area≥0.12mm^2 (AWG24-26), shield must connect with FG terminals.
- cable length: cable length as short as possible, CN1 control cable should be less than 3meters, signal feedback CN2 cable should be less than 20meters.
- Cabling: away from power circuit cabling to prevent interference entering. Please install surge absorber component in the relevant circuit inductor components (coil); direct current coil anti-parallel free-wheeling diode, AC coil in parallel and RC absorb return circuit.

2.4 The principle diagram of the signal interface

2.4．1 digital input interface circuit

Digital input interface circuit could be controlled by relay or open collector transistor circuit. User provide power, DC12～24V, current≥100mA; note; if the current polarity reversed, the drive does not work. Input signal SON ALRS INH CLR SC1 SC2 can refer to this connection mode.



When input signal connect with OV, signal is ON input and effective. It can be judged by display menu UN-16, when input ON, the corresponding nixie tube will be light. Input OFF, the corresponding nixie tube will die out. Use this display content properly, convenient for servo input signal debugging and maintenance.

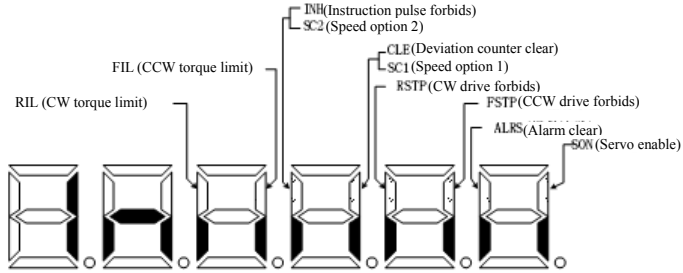
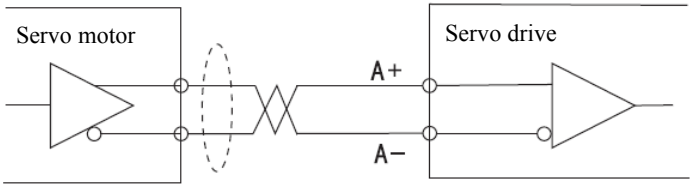


Chart 6.3 Input terminal display (light display ON, go out display OFF

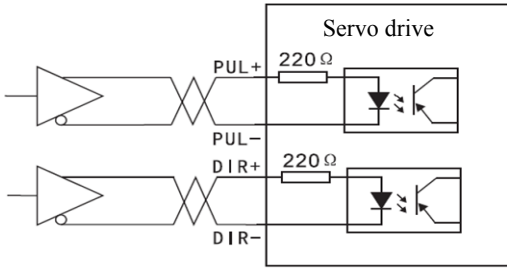
2.4．2 Servo motor photoelectric encoder input interface

In the differential output mode, use AM26LS32、MC3487 or similar line drive RS422 as a receiver.



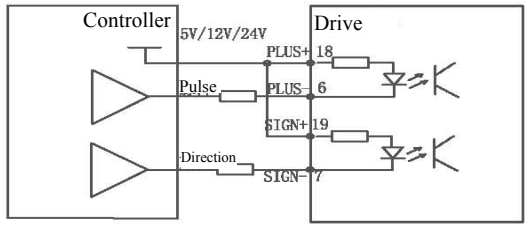
2.4．3 The pulse signal input interface circuit

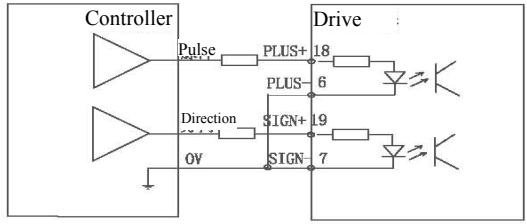
In order to transmit pulse data correctly, suggest to use differential drive way; in differential drive mode, use AM26LS31、MC3487 or similar line driver RS422 as follow diagram



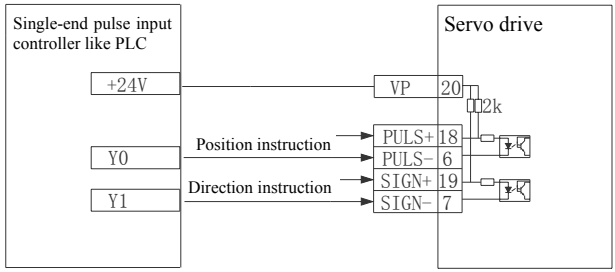
Using single-ended drive mode will lower the operating frequency. Based on the design characteristics of this product, there are two modes of connection.

Mode 1: Outside series resistor, input circuit according to the pulse quantity. drive current 10～25mA，limit external power maximum voltage as 24V, determine the value of resistance R. experience data: VCC=24V，R=1.3～2k; VCC=12V, R=510～820Ω. External power supply provided by user, please note that if the power polarity reversed, the servo drive unit will be damaged. Details as follow diagram.



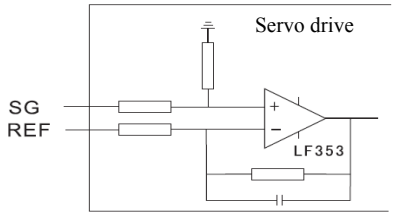


Mode 2: do not use series resistance, using the resistance function of the internal drive to realize. Wiring method as below diagram

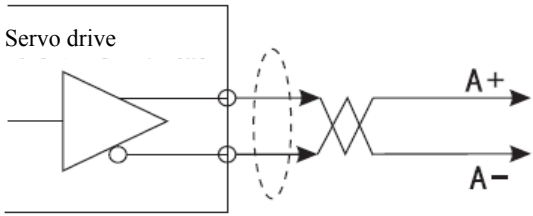


2.4．4 The analog input interface

Analog input voltage can not more than ±10V, excessive voltage will damage the drive; and suggest using twisted-pair cable to connect.

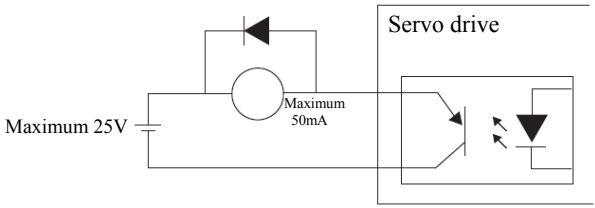


2.4．5 The drive speed output interface



2.4．6 The digital output interface circuit

Please pay attention to the power polarity when using external power, reversed polarity will damage the drive. Digital output is open collector mode, limit external voltage maximum as 24V, maximum current is 10mA. In terms of load, when using relay etc inductive load, a diode need be added to parallel with inductive load, if the polarity of the diode is reversed, the drive will be damaged.



Chapter 3 operate and display

3.1 Keyboard operation

- Servo panel with 6 LED nixie tube display and 4 buttons to display various status, parameter setting etc. Key functions as follows:

  ：serial number, values increase, or option forward.

  ：serial number, values decrease, or option back.

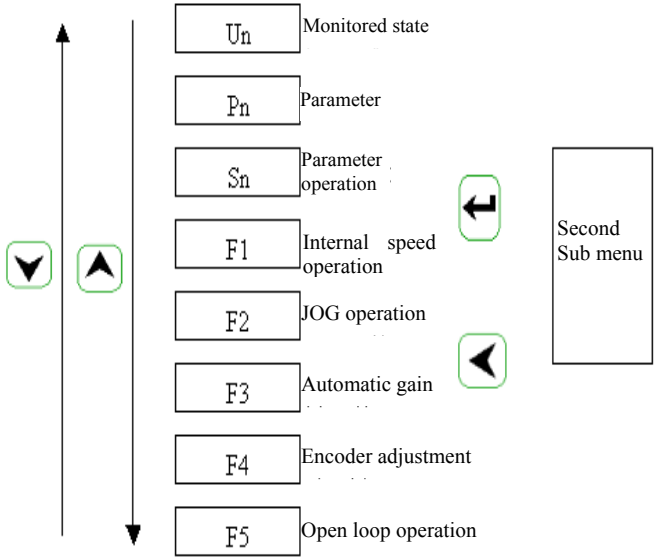
  ：return to upper menu or cancel the operation.

  ：enter the next layer menu operation or input confirmation.

Note: 、 keep press down, repeat operation, the longer the holding time, the faster the repetition rate.

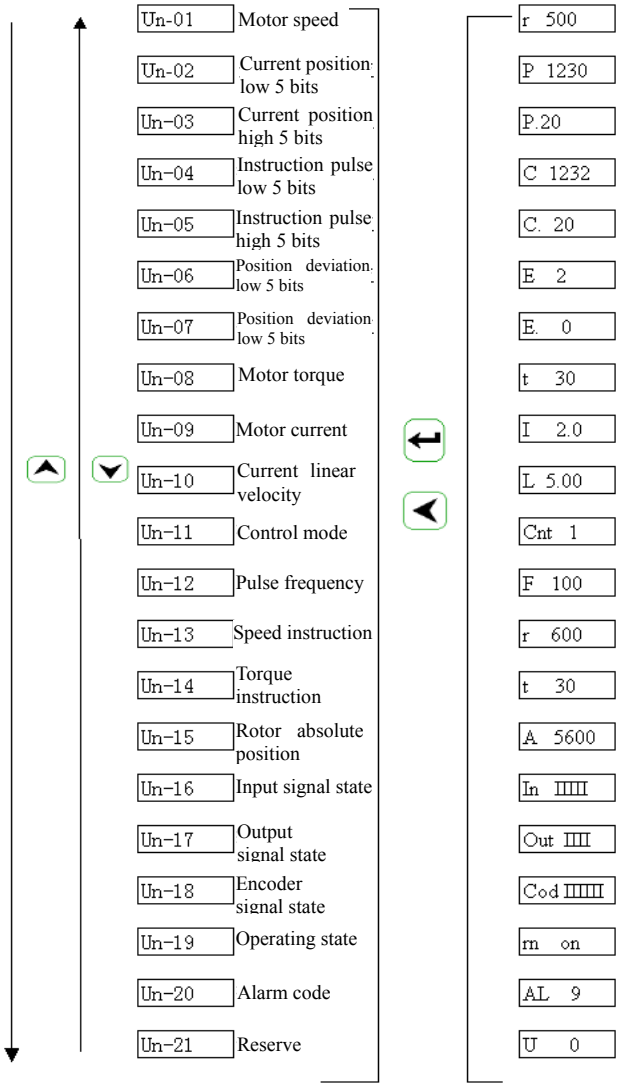
*** 6 section LED digital tube display all kinds of status and data of the system, all digital tube or the decimal point of the right digital tube blink, it means alarm.

***Operate according to multiple-layer menu, the first layer is main menu, including 8 kinds operation mode, the second layer is the function menu of all operation modes. The below diagram shows the main menu operation:



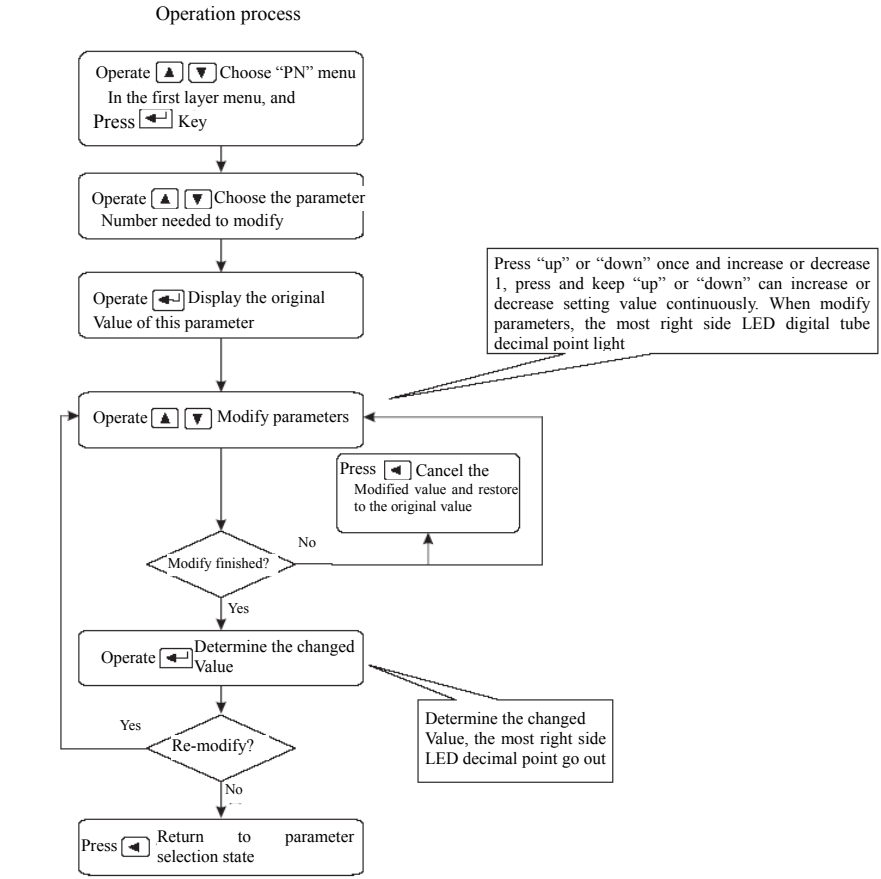
3.2 Monitoring method

Choose “Un-” in the first layer, press ↵ entering monitoring mode; there are 21 display status, the user use ▲、▼ to choose the display mode.



3.3 Parameter setting

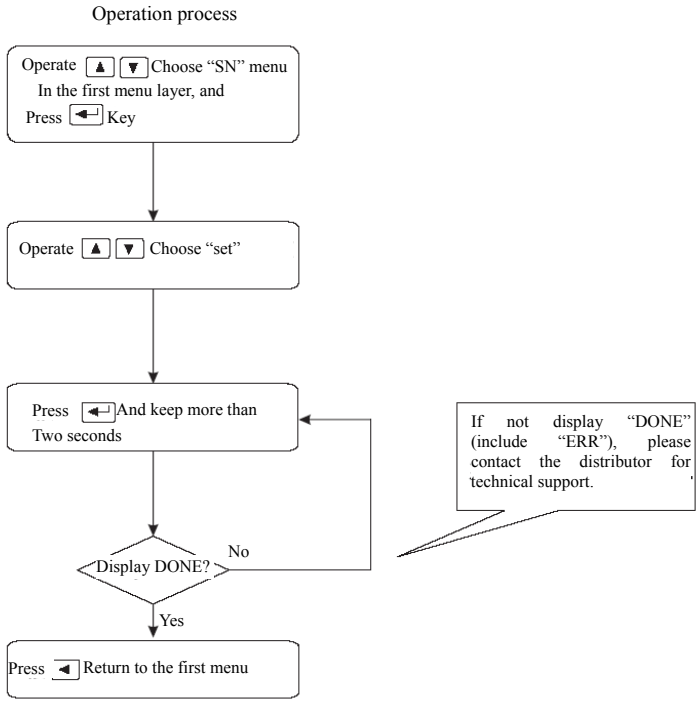
Choose “PN-” in the first layer, and press key to enter parameter setting mode. Use 、 to choose parameter, press key , display the value of the parameter, use 、 to modify parameter values. press or once, parameter increase or decrease one, press and keep or , the parameter can be increase or decrease continuously. When the parameter value changed, the LED digital tube decimal point of the right illuming, press to make sure the modified value is effective, the LED digital tube decimal point of the right side go out, the modified value will be reflected in the control immediately, then press or keep on modify parameter, after modified press back to the parameter selection status. If not satisfied with the modified value, do not press , can press to cancel, restore original parameter value, and back to the parameter selection status.


Operation process
Operate ▲ ▼ Choose "PN" menu In the first layer menu, and Press ↵ Key
Operate ▲ ▼ Choose the parameter Number needed to modify
Operate ↵ Display the original Value of this parameter
Press "up" or "down" once and increase or decrease 1, press and keep "up" or "down" can increase or decrease setting value continuously. When modify parameters, the most right side LED digital tube decimal point light
Operate ▲ ▼ Modify parameters
Press ◄ Cancel the Modified value and restore to the original value
No
Modify finished?
Yes
Operate ↵ Determine the changed Value
Determine the changed Value, the most right side LED decimal point go out
Yes
Re-modify?
No
Press ◄ Return to parameter selection state

3.4 Parameter management

Parameter management mainly deal with the operation between memory and EEPROM, choose "Sn-" in the first layer, and press ↵ entering parameter management mode. First, choose the operation mode, there are 5 modes, use ▲、▼ to choose. Take "parameter write in" for example, choose "Sn-Set", press ↵ and keep more than 2 seconds, if the write success, display "DONE", if fail, display "ERR". Press ◄ again back to the operation mode selection status.

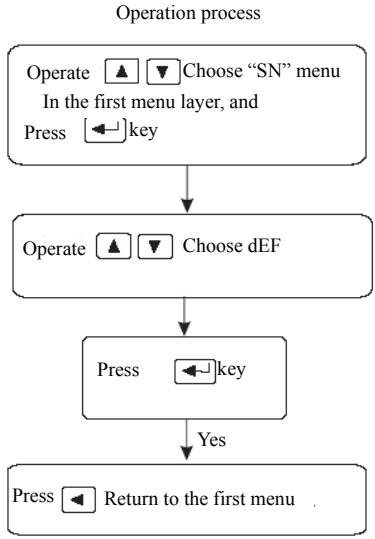
Sn－SEt parameter write in, it means to write the memory parameter to the parameter area of EEPROM. When the users changed the parameters, only the memory parameter values changed, next power supply will be restored to the original value. If you want to change the parameter values permanently, need to perform write in operation, write the memory parameter into parameter area of EEPROM, next power supply will use the modified parameters.


Operation process
Operate ▲ ▼ Choose "SN" menu
In the first menu layer, and
Press ◄┘ Key
Operate ▲ ▼ Choose "set"
Press ◄┘ And keep more than
Two seconds
If not display "DONE" (include "ERR"), please contact the distributor for technical support.
Display DONE?
No
Yes
Press ◄ Return to the first menu

- **Sn－rd** parameter read, it means read the data in parameter area into the memory. The process will perform automatically when power on, at the beginning, the memory parameter and the EEPROM parameter is the same. But when the user modified the parameter, the memory parameter value

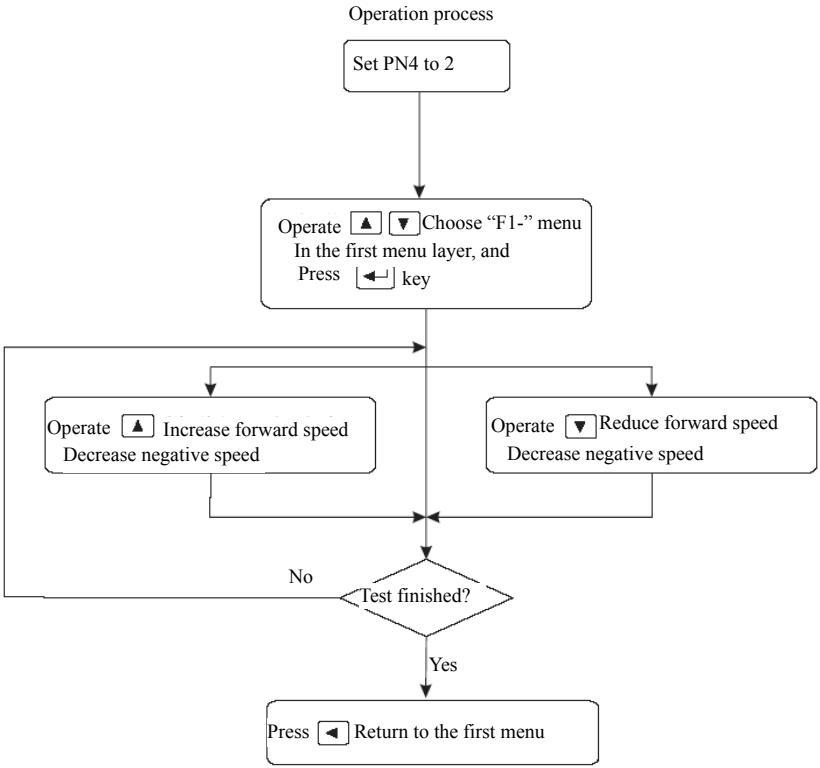
changed too. When the user is not satisfied with the modified parameter or the parameter is messy, perform the parameter cancel operation, the data in the ENPROM parameter area will read into the memory again and restore to the original parameters when power on at the first time.

- **Sn－SS retains**
- **Sn－rS retains**
- **Sn－dEF** restore default value, it means to read all the parameter default value(factory defaults) into the memory, and write in the EEPROM parameter area, next power on will use the default parameter. When the user messed the parameter and can not work properly, use this operation can restore all parameters to factory default. As different drive mode with different parameter default values, when using restore default parameters, must first ensure the motor ID (parameter PN1) is correct.


Operation process
Operate ▲ ▼ Choose “SN” menu
In the first menu layer, and
Press ↵ key
Operate ▲ ▼ Choose dEF
Press ↵ key
Yes
Press ◄ Return to the first menu

3.5 F1 Operation mode (panel test-run function)

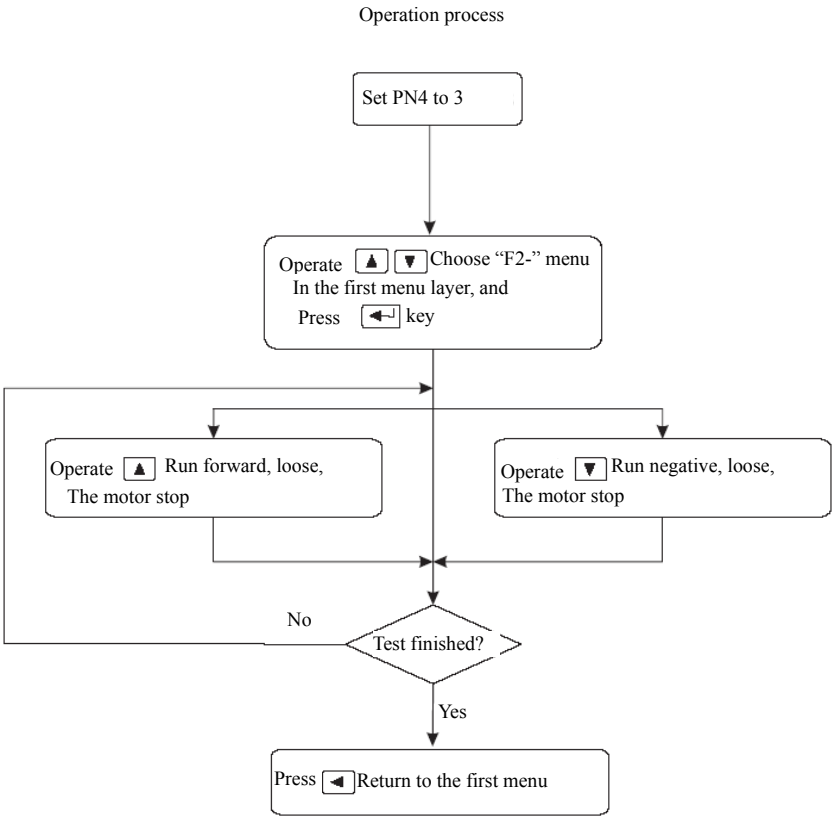
Choose “F1-” in the first layer, press entering speed trial operation mode. Speed trial prompt is “S”, value unit is r/min. Speed instruction provided by keys, use 、 can change speed instruction. The motor operated at the given speed. Control the speed positive increasing, control the speed reducing (reverse increasing). When the speed value is positive, the motor rotated in the forward direction; when the speed value is negative, the motor rotated in the reverse direction. Note: the speed mode is a continuous motion, please ensure the motion axes with enough run distance to avoid impact and limit.



Note: if without outside enable signal, please set PN57 parameter as 1. Or the motor won’t work.

3.6 F2 Operation mode (jog test function)

Choose “F2-”in the first layer, press entering jog operation mode. JOG run prompt is “J”, value unit is r/min，speed instruction provided by keys. Enter F2 operation, press key and keep, motor run at jog speed, release the button, motor stop running, retain zero speed; press and keep, the motor inverted running at jog speed, release the key, the motor stop running, retain zero speed, jog



speed set by parameter PN22.

Note: if without outside enable signal, please set PN57 parameter as 1. Or the motor won’t work.

3.7 Other

Motor aging function: set Pn4 as 6, set Pn57 as 1. Servo performs automatic forward inversion process. Rotation speed can be set by Pn23. The cycle of forward and reversed rotation is 2S. Used to aging motor or drive.

F4 is the photoelectric encoder zero set function, for motor manufactures use. The user can not use it.

F5 function reserve.

Chapter 4 parameter

SD series servo with total 96 parameters can be adjusted, it can be divided to three levels according to application object, Pn1-Pn59 is user parameters, Pn60-Pn96 is a complete set of motor parameters; adjust the user parameters can meet most requirements of the user. The motor mating parameters can not be modified randomly, or there will be unpredictable results appear. Pn5-Pn16 are position control parameters, Pn17-42 are speed control parameters, Pn43-Pn50 are current control parameters, Pn51-Pn59 is I/O control parameters. Pn60-Pn96 are motor mating parameters.

Serial No.	Name	No.	Name
0	user password	29	acceleration time constant
1	motor ID	30	deceleration time constant
2	system software version	31	simulation speed/moment of force instruction gain
3	initial display status	32	zero speed range
4	control mode selection	33	simulation speed/torque filter
5	position proportion gain	34	simulation speed/torque zero set mode
6	position feedforward gain	35	zero offset 1
7	position feedforward low pass filter	36	zero offset 0
8	position instruction pulse input mode	37	simulation speed /torque motor rotation direction
9	position instruction gear ratio numerator	38	simulate instruction convert mode
10	position instruction gear ratio denominator	39	simulation instruction slope
11	position instruction reverse	40	speed mode selection
12	location finish range	41	speed output electronic gear ratio numerator

13	position error range	42	speed output electronic gear denominator
14	position error invalid	43	current loop proportion gain
15	location smoothing filter	44	current loop integral time constant
16	drive ban input invalid	45	interior CCW torque limitation
17	speed proportion gain	46	interior CW torque limitation
18	speed integral time constant	47	external CCW torque limitation
19	speed detection low pass filter	48	external CW torque limitation
20	maximum speed limit	49	internal speed, JOG torque
21	arrival speed	50	torque instruction filter
22	jog running speed	53	input terminal low 4 reverse
23	interior speed 1	54	input terminal high 4 reverse
24	interior speed 2	55	output terminal reverse
25	interior speed 3	56	I/O entrance filter time constant
26	interior speed 4	57	automatic enable motor
27	less line motor polarity position	58	encoder break line detection invalid
28	reserve	59	drive production date
60	motor inertial ratio	61	current rated torque
62	motor rated speed	64	motor rated current
65	the system allowed maximum overload capacity	68	current instruction low pass filter
86	encoder line number	87	encoder zero
92	motor pole pairs	95	automatic enable valid

4.1 All parameters function and significance detail list

No.	name	function	parameter range
0	parameter password	① password with different level, corresponding to user parameters, system parameters ② To modify the motor ID(Pn1), must set this item to 0, set user password to 100. Please consult the manufacture for system parameters.	0~300
1	Motor ID	Used to form a complete set of motor model. Each motor with a unique ID number, if want to modify this parameter, must set password Pn1 to 0 and then modify this parameter.	1~100
2	software ID	reserve manufacture use	
3	initial display status	Choose the display status when the drive power on 0: display motor rotation speed; 1: display current position low 5; 2: display current position high 5 8: display motor current; 11:display position instruction pulse frequency; 12:display speed instruction; 13:display torque instruction; 14:Display rotor absolute position	0~20

No.	Name	function	parameter range
4	control mode	The drive control mode can be set by this parameter: 0: location control mode; 1: speed control mode; 2: internal speed control mode; 3: jog control mode. 6: aging test mode	0~6
5	position proportion gain	Set the proportion gain of the location loop regulator. The greater the setting value, the higher the gain, and the greater the stiffness, under the same frequency instruction pulse condition, the location hysteresis will be less. But if the value is too big may cause oscillation or overshoot.	1~1000
6	position feedforward	When the feedforward gain of the location loop increase, the high-speed response characteristics of the control system will be enhanced, but it make the system location loop unstable and easy to vibrate. Unless very high response characteristics needed, the location loop feedforward gain usually set to 0.	0~100
7	location feedforward low-pass filter cutoff frequency	set location loop feedforward low-pass filter cutoff frequency, the high the cutoff frequency, the better the position tracking, but easy to vibrate.	1~1200
8	location instruction pulse input form	Set the location instruction pulse input form 0: pulse＋sign; 1: CCW pulse/CW pulse; CCW is observed from the axial of servo motor, counter clockwise rotate, it define as forward direction. CW is observed from the servo motor axial, clockwise rotate, it define as reverse direction.	0~1

9	location instruction pulse frequency division numerator	electronic gear ratio numerator	1~32767
10	location instruction pulse frequency denominator	electronic gear ratio denominator	1~32767
11	location control motor rotate direction	0: normal; 1: direction reversed.	0~1
12	location finished range	set the location finish pulse range under the location control; This parameter provide basis whether drive unit judge finished location under the location control mode.	0~30000
13	location tolerance detection range	set location tolerance alarm detection range; under the location control mode, when the count value in the position deviation counter over this parameter, the servo drive unit will give position error alarm.	0~30000
14	location error invalid	0: location error alarm detection valid; 1: location error alarm detection invalid, stop detecting location error.	0~1
15	location instruction smoothing filter	smooth filtering instruction pulse, with exponential form acceleration and deceleration, numerical value means time constant; The filter will not lose input pulse, but there will be instruction delay phenomenon; When set to 0, the filter doesn't work.	0ms ~20000×0.1 ms

No.	Name	function	Parameter range
16	drive ban input invalid	0: CCW、CW input ban valid; 1: cancel CCW、CW input ban.	0~1
17	speed proportion gain	Set the speed loop regulator proportion gain; The greater the setting value, the higher the gain, and the greater stiffness. The greater the load inertia, the greater the setting value.	5Hz ~2000Hz
18	speed integral time constant	Set speed loop regulator integral time constant; The smaller the set value, the faster integral speed and the greater stiffness. The greater load inertia, the greater the set value. At the frequent start-stop small power occasion, the set value is small to prevent overshoot.	1ms ~1000ms
19	speed detection low pass filter	set speed test low pass filter characteristic; The smaller value, the low cutoff frequency, the smaller the motor noise. If the load inertia is large, could reduce the setting value. The value is too small may lead to low response and vibration. The larger the value, the high the cutoff frequency, the speed response faster. If high speed response needed, could increase the setting value.	1%~500%
20	rated speed	rated speed of the motor	0~ 4000
21	reach speed	Set the speed value when input signal reach effective	0~3000
22	jog speed	Set jog speed.	-3000 ~3000 r/min

No.	Name	function	parameter range
23	defined speed 1	under the speed control mode, when SC1 OFF，SC2 OFF , choose internal speed 1 as speed instruction.	-3000 ~3000 r/min
24	defined speed 2	under the speed control mode, when SC1 ON，SC2 OFF , choose internal speed 2 as speed instruction.	-3000 ~3000 r/min
25	defined speed 3	When SC1 OFF, SC2 ON, choose internal speed 3 as speed instruction.	-3000 ~3000 r/min
26	defined speed 4	under the speed control mode, when SC1 ON，SC2 ON, choose internal speed 4 as speed instruction.	-3000 ~3000 r/min
27	motor magnetic pole position	magnetic pole position of the line type motor	1~7
29	acceleration time constant	Set value means the motor acceleration time from 0r/min~1000r/min. Acceleration and deceleration are linear. Only used for speed control mode, it is invalid for location control speed. If the drive unit combined with external location loop, this parameter should be set to 1.	0ms ~1000ms
30	deceleration time constant	Set value means the motor deceleration time from 1000r/min~0r/min. Acceleration and deceleration are linear. Only used for speed control mode, it is invalid for location control speed. If the drive unit combined with external location loop, this parameter should be set to 1.	0ms ~1000ms
31	simulation speed/torque instruction gain	Simulate the gain when the instruction transfered to speed/ torque. The larger the gain, the unit voltage corresponding motor speed is higher (the bigger the torque). The speed curve slope is bigger.	20～3000HZ

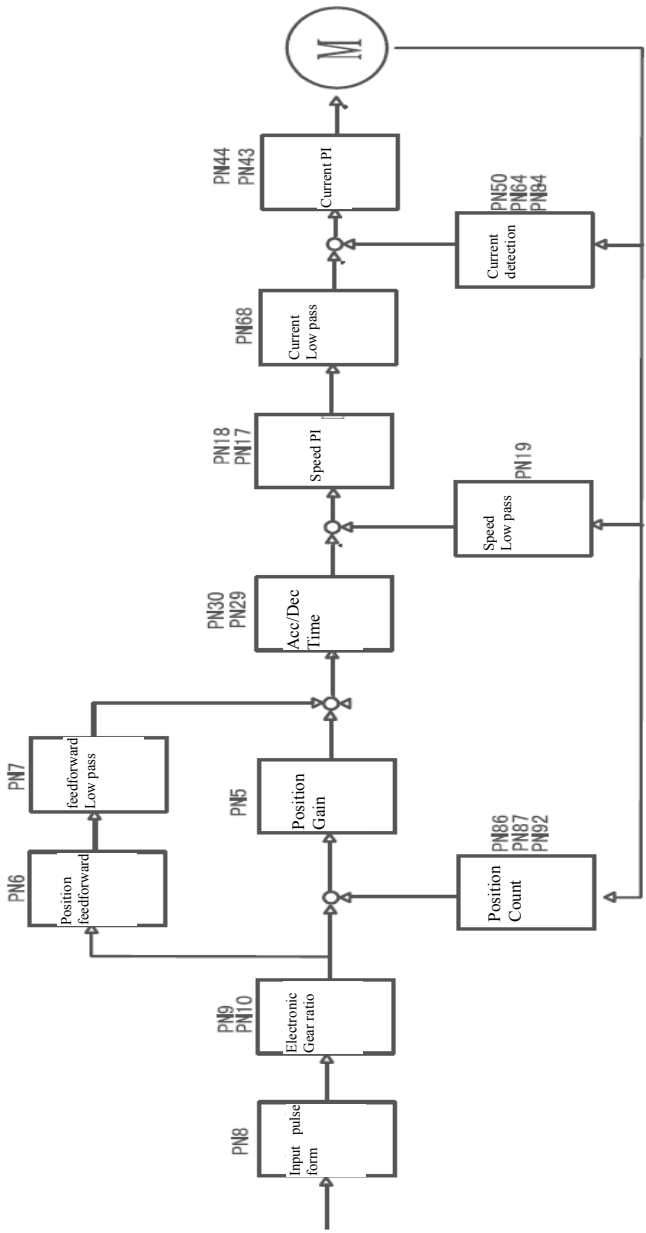
No.	Name	function	parameter range
32	zero speed range	When external simulate voltage sampling value lower than this parameter, motor zero speed.	0~1023
33	simulation speed/torque instruction filter	Filtering the simulation instruction, the larger the setting value, the motor run more smoothly, but the tracking effect is worse. The smaller the setting value, the better the speed tracking ability (torque more stable). But easy to vibrate.	0~1500
34	simulation speed/torque	0: high and low speed set zero separately; 1:high and low speed both with high speed set to zero	0~1
36	simulation zero correction 0	Under the simulation speed control mode, no voltage input, but the motor also with tiny rotation. Adjust this parameter can make the motor keep zero speed（adjust zero speed corresponding analog voltage offset）.	412~1600
37	simulation speed/torque motor rotate direction	0: Normal; 1: simulation instruction reverse; 2: output encoder pulse reverse; 3: simulation instruction and output encoder pulse reverse.	0~3
38	simulation instruction conversion mode	0: straight line 1: exponent	0~1
39	reserve	simulation instruction slope	1~1023
40	speed instruction option	Under the speed mode, the speed from internal speed or simulation instruction. 0 internal speed 1 simulation instruction	0~1

41	speed output electronic gear ratio numerator	Every circle feedback pulse from encoder in the drive unit output by gear.	1~255
42	speed output electronic gear ratio denominator	Every circle feedback pulse from encoder in the drive unit output by gear.	1~255
43	current loop proportion gain	The higher the set value, the greater the gain, the current tracking error is smaller. But too much gain will produce vibration or noise, it related with the servo motor, with nothing to do with the load.	1～500
44	current loop integral time constant	The smaller the set value, the faster the integral speed, and the current tracking error is smaller. But too small integral will produce vibration or noise. It related with servo motor, with nothing to do with the load. Try to set larger value under the condition the system do not with vibration.	1~10000
45	interior CCW torque limitation	Set the internal torque limitation value of the servo motor CCW direction; the set value is the percentage of the rated torque.	0%~300%
46	interior CW torque limitation	Set the internal torque limitation value of the servo motor CW direction; the set value is the percentage of the rated torque.	-300%~0%
47	interior CCW torque limitation	Set the external torque limitation value of the servo motor CCW direction; the set value is the percentage of the rated torque.	0%~300%
48	interior CW torque limitation	Set the external torque limitation value of the servo motor CW direction; the set value is the percentage of the rated torque.	-300%~0%
49	torque set	internal speed, jog speed torque	0~300%

50	torque instruction filter	Set the torque instruction filter characteristics. It can restrain the vibration which produced by torque (the motor give out sharp vibration noise). The smaller the value, the lower the cutoff frequency, the smaller noise produced by motor. If the load inertia is very big, can reduce the set value properly. If the value is too small, may result in slow response and may cause instability.	1%~500%
53	input low 4 reverse	input signal XX XX ALRS SON bitwise reverse	0000~1111
54	input high 4 reverse	input signal XX XX INH CLE bitwise reverse	0000~1111
55	output port reverse	input signal CZ COIN ALM XX bitwise reverse	0000~1111
56	IO port sampling time	IO signal sampling time	1~1000*0.1 ms
57	automatic enable motor	automatic enable motor	0~1
58	encoder break line test invalid	0: test break line 1: do not test break line	0~1
59	production date	indicate drive production date	present
60	motor inertia ratio	set motor inertia ratio	1～32767
61	motor rated torque	set motor rated torque	1～1000
62	motor rated speed	Set motor rated speed.	0～4000 r/min
64	motor rated current	Set motor rated current. Set value is valid.	1～500×0.1A
65	system allowed	Set system allowed maximum overload	0～300%

	maximum overload capacity	multiples.	
68	current instruction low pass filter	Set current instruction low pass filter cutoff frequency. Used to limit the current instruction frequency band, avoid the current shock and vibration, make the current response stably.	1～1500HZ
86	encoder line number	Set encoder each rotate line number	1～10000line/turn
87	encoder zero	Set the encoder zero and can not be changed	0～9999 pulse
92	motor number of pole-pairs	Set motor pole-pairs number. Different manufacture and different series, the motor pole-pairs number may different.	1～6
95	automatic enable effective	When set to 0, SON decided by the I0 port input signal; when set to 1, SON will be forced to ON（has nothing to do with the I0 input signal）	0～1

4.2 parameter adjust diagram model


M
PN44
PN43
Current PI
PN50
PN64
PN84
Current detection
PN68
Current Low pass
PN18
PN17
Speed PI
PN19
Speed Low pass
PN30
PN29
Acc/Dec Time
PN7
feedforward Low pass
PN6
Position feedforward
PN5
Position Gain
PN86
PN87
PN92
Position Count
PN9
PN10
Electronic Gear ratio
PN8
Input pulse form

4.3 Servo key parameters

As the default motor mating parameters has been optimized, therefore, the parameters (except electronic gear) do not need to adjust in most applications and can be used directly. But the actual mechanic is complex. If abnormity appear or needs high response when adjusting, then need to adjust the parameters to meet requirement. The adjustment principle is first current loop, second speed loop, last location loop.

The current loops do not need to adjust except for individual situation. The too fast speed response results in current shock and AL11 alarm. It can adjust PN64 to solve.

speed loop: If high speed response needed, can increase PN17 or decrease PN18. But PN17 is too large to vibration. In the occasion of too big load inertia, if the load motor park unstably when decelerating and wag from side to side, need to increase PN18 to solve.

Location loop: If high location response needed, can increase PN5. Some occasions can increase PN6 to meet requirement. But PN5 PN6 is too large to vibration. The setting precondition is to adjust PN5 prior, only in the short distance and high response occasion can PN6 be used.

electronic gear ratio: 1）if calculate from rotate speed angle, the below formula can be used

$$f \times (PN9/PN10)=10000$$

in which f denotes the upper computer pulse, unit is KHZ/circle

If knows the pulse number from the upper computer and make the motor or load turn a circle, the gear ratio set value can be calculated with above formula.

2） calculate according to the location accuracy directly

（lead/pulse equivalent）×(PN9/PN10)=10000

For example: screw lead is 5mm, motor and screw lead connected directly, the motor rotates a circle, the load move 5mm. If the accuracy need 0.001mm, there are 5000 pulse need for rotating a circle; that is: PN9=2，PN10=1

Pulse input form: support pulse with direction and double pulse (positive and negative pulse), set PN8

4.4 parameter adjusting steps in actual application

In the process of adjusting or application, if there is vibration, noise or can not reach the control accuracy, following methods can be used to adjust system parameters and meet the control requirement.

When the motor is in static locking state, if there is vibration or sharp noise, please decrease parameter Pn43; set this parameter as large as possible under the condition of no vibration. The larger the parameter, the better the current tracking effect and the faster the motor response; but the too large parameter results in vibration or noise.

（1）: speed control mode parameters adjustment

① [speed proportion gain]（parameter Pn17）set value, as large as possible under the condition of no vibration. Generally, the large the load inertia, the set value should be large.

② [speed integral time constant]（parameter Pn18）set value, try to set small according to the given condition. If the set value is too small, the response speed will be increased, but prone to vibration. Try to set the value as small as possible under the condition of no vibration. If the value is too large, when the load changed, the speed will change greatly.

（2）: position control mode parameter adjustment

①according to above method to set proper[speed proportion gain]和[speed integral time constant].

② [position feedforward gain]（parameter Pn6）set to 0%.

③ [position proportion gain]（parameter Pn5）set value, set as large as

possible in the stable range. When the parameter is large, the position tracking will be good and hysteresis error is small, but easy to produce vibration when stop positioning. When the parameter is small, the system in stable state, but the position tracking become worse and hysteresis error become larger.

④If require position tracking quite high, can increase Pn6 set value; but if it is too big, can lead to overshoot.

Chapter 5 operation and adjustment

5.1 power connection

① Connect the three phase AC 220V power to input terminal (SD***K3/K5servo drive three phase connect L1、L2、L3, single phase connect L2、L1),（SD***K0servo drive single phase connect L、N）

② when the power on, delay about 2 seconds, servo motor ready, the signal is ON, at this time, can receive servo enable(SON) signal. Detected the servo enable is effective, the drive output is effective, motor incentive, in operating state. Detected the servo enable is invalid or alarmed, the motor in free state.

③ Frequently off-on power supply, may damage the soft start circuit and energy consumption braking circuit, it is better to limit the off-on frequency below 10 times each hour and 50 times a day. If the servo drive or motor overheating, after excluded failure cause, must cool 5 minutes and then can switch on again.

5.1.1 Power on sequence

① When the power supply switch on, 1S servo alarm signal output, 10MS response to enable signal, less than 10MS motor excitation lock; waiting for running.

5．2 Position control mode

① Connect CN1, input the pulse signal from host computer connect into CN 1 pin18, 6, 19, 7, servo enable (SON) OFF.

② Connect control circuit power and main circuit power, the display of the drive lighten.

If there is alarm, please check the line connection.

③ Choose control mode（parameter Pn4）set to position running mode（set to 0）, Pn8 Set parameter Pn8 according to controller output signal mode, and set suitable electronic gear ratio (Pn9, Pn10).

④ Confirm there is no alarm and any abnormal situation, make enable servo (SON) ON, at this time, the motor motivated, in a state of zero velocity.

⑤ Adjust the pulse frequency of the input signal, make the motor running according to instruction.

5.3 Speed control mode running

Speed control mode divided to external analog voltage speed control and internal speed control:

1) External analog voltage speed control mode:

① connect CN1, input the analog voltage signal from the host computer intoCN1 pin 17,4, set servo enable (SON) OFF.

②Connect control circuit power and main circuit power supply, the drive display light. If there is alarm, please check the line connection.

③Set control mode（parameter Pn4）to speed operation mode (set to 1), and set Pn40 parameter to 1.

④ Confirm there is no alarm and any abnormal situation, make servo enable (SON) ON, at this time, the motor motivated, in the state of external analog voltage control speed, the motor will with small rotation. Adjust PN.36 parameter, make the motor rotate speed as zero.

⑤ If change the controller output analog voltage size, can change the rotate speed and change the analog voltage polarity, and also the rotate direction.

2）internal speed control mode:

① Connect CN1，make input control signal: servo enable (SON), speed option 1 (SC1), speed option 2 (SC2) OFF.

②Connect control circuit power and main circuit power supply, the drive display light. If there is alarm, please check the line connection.

③Set control mode（parameter Pn4）to speed operation mode (set to 1), and set Pn40 parameter to 0 , set speed parameter Pn23～Pn26 based on the need.

④Confirm there is no alarm and any abnormal situation, make servo enable（SON）ON, at this time, the motor motivated, in the state of internal speed 1 running. Change CN1 input terminal signal state, and let the motor run as the setting speed.

5.4 Speed trial operation mode

① Connect CN1, input control signal: servo enable（SON）set OFF.

② Connect control circuit power and main circuit power supply, the drive display light. If there is alarm, please check the line connection.

③Set control mode（parameter Pn4）to speed operation mode（set to 2）.

④Confirm there is no alarm and any abnormal situation, make servo enable

（SON）ON ,at this time, the motor motivated, in a state of zero speed.

⑤ Through key operation enter F1 speed trial operation mode, speed trial operation prompt is “S“, value unit is r/min, system in the speed trial mode, speed instruction provided by key, use change speed instruction, the motor run based on the setting speed.

5．5 jog operation

①Connect CN1, input control signal: servo enable（SON）set OFF.

②Connect control circuit power and main circuit power supply, the drive display light. If there is alarm, please check the line connection.

③Set control mode（parameter Pn4）to JOG operation（set to 3）.

④Confirm there is no alarm and any abnormal situation, make servo enable（SON）ON, at this time, the motor motivated, in a state of zero speed.

⑤Through key operation enter F2 jog operation state, JOG prompt is “J”, value unit is r/min，system in the speed control mode. The speed, direction decided by parameter Pn22, press , the motor run based on the speed and direction of Pn22 parameter, press , the motor rotate based on the setting speed.

Chapter 6 Alarm and processing

If the servo with failure in use, the display will show: Al—xx, please operate according to the contect of this chapter, get rid of the corresponding and can be put into use again.

6.1 alarm list

alarm code	alarm name	alarm reason
AL-0	normal	
AL-1	overspeed	servo motor speed exceeds the set value
AL-2	main circuit overvoltage	main circuit voltage too high
AL-3	main circuit undervoltage	main circuit voltage too low
AL-4	position tolerance	motor with deviation over parameter Pn13 setting value
AL-6	speed amplifier saturation	speed amplifier saturated a long time
AL-9	encoder abnormal	encoder with break line or short circuit
AL-10	control power undervoltage	control the power below±15V
AL-11	excess current 1	IPM module output current is too large
AL-12	excess current 2	DSP detection current is too large
AL-13	excess load	servo output torque over the allowed value
AL-14	braking abnormal	braking circuit abnormal
AL-15	encoder count abnormal	encoder AB signal abnormal
AL-16	memory abnormal	servo inside EEPROM read-write abnormal
AL-17	encoder Z pulse abnormal	motor rotate 2 circle, the encoder find no Z pulse
AL-18	encoder UVW signal	encoder UVW signal wrong or the

	abnormal	encoder doesn't match
AL-19	encoder UVW signal illegal code	UVW signal with high level or low level
AL-20	CPLD communication abnormal	CPLD communication abnormal

6.2 Alarm processing method

alarm code	alarm name	reason	processing method
AL-1	overspeed	input pulse frequency is too high	set correct input pulse instruction
		input electronic gear ratio is too large	set correct Pn9 Pn10 parameter
		encoder zero error	ask the factory to reset the encoder zero
		motor U、V、W lead wire wrong	confirm the wiring sequence
AL-2	main circuit overvoltage	input L1 L2 L3 power voltage higher than AC260V	reduce power voltage
		brake circuit capacity is not enough **(tend to occur in the occasion that frequently and rapidly start and stop and the load inertia is large)**	prolong control system acceleration and deceleration time contact manufacturer to increase braking resistance capacity
AL-3	main circuit undervoltage	input L1 L2 L3 power voltage less than AC170V	find out the external reason of low voltage
		servo protection action	replace a new servo drive

AL-4	position error	perform operation, the motor does not turn any angle, immediately alarm	confirm UVW wire phase sequence correct or not confirm if the input pulse frequency is too high pulse electronics gear setting it too large, set parameter Pn9 Pn10.
		alarm when rotating (**input pulse abnormal**)	confirm input pulse frequency and width
		alarm when rotating (**error detection range is too small**)	set parameter Pn13 larger
		alarm when rotating (**position proportion gain is too small**)	increase position gain Pn5 set value
		alarm when rotating (**lack of torque**)	higher power servo motor
AL-6	speed amplifier saturation	motor mechanically locked	check the load mechanical part
		the load is too large	decrease load, change a higher power drive and motor
AL-9	encoder failure	encoder wiring wrong or line break	check or change encoder wire
		caused by interference	set Pn58 to 1
		the encoder cable is too long, lead to the encoder power voltage a little low	shorten the cable
AL-10	±15Vcontrol power undervoltage	±15V control power is low	replace a new servo drive
AL-11	Over-current 1	grounding defective	grounding correctly
		motor insulation damaged	replace a new motor
		motor winding with short circuit	replace a new motor
		servo motor parameters do not match	Correctly set motor ID number Pn1
		deceleration time is too short	increase the host computer acceleration and deceleration time

		current surge	decrease parameter Pn43 Pn5 value increase parameter Pn64 value
		pulse input is not well-distributed	increase pulse smoothing parameter Pn15 value
		servo protection action	replace a new servo drive
AL-12	Over-current 2	motor insulation damaged	replace a new motor
		grounding defective	grounding correctly
		servo protection action	Replace a new servo drive
AL-13	excess load	servo output torque over the allowed value	mechanically locked or resistance is large, motor type is not good, change to higher power drive and motor
AL-14	braking abnormal	servo protection action	replace servo drive unit
		brake circuit capacity is not enough	increase acceleration/deceleration time constant replace a larger power servo and motor
		main circuit power is too high	check the AC input power supply
AL-15	encoder count abnormal	encoder connection errors	check or replace the motor encoder line
		grounding defective	grounding correctly
		servo motor defective	replace servo motor
AL-16	EEPROM abnormal	servo inside EEPROM read-write abnormal	replace servo drive
AL-17	encoder Z pulse abnormal	Z pulse not exist, encoder damaged, cable shielding defective, encoder interface circuit fault	check the encoder line inserted or not check or replace the encoder line
AL-18	encoder UVW signal abnormal	encoder UVW signal damaged, encoder Z signal damaged, cable shielding defective,	check the encoder line inserted or not, check or replace the encoder line, replace servo drive.

AL-19	encoder UVW signal illegal code	encoder UVW signal damaged cable defective cable shielding defective	check the encoder line inserted or not, replace the encoder line, replace servo drive.
AL-20	CPLD abnormal	CPLD communication abnormal	change servo drive

Special explanation: if the servo drive alarm, but after power on again, the alarm will disappear. Generally, it is considered that the servo drive outside parts with problem or the parameter adjusted improperly, please check the servo peripheral parts. For example: power voltage, controller, mechanical load, motor etc. if the peripheral parts without problem, please consult the manufacture about parameter adjustment.

If the alarm can not clear after power on, please replace the servo drive and observe.

6.3 Common problems in use or exception handling

1、No-load operation motor vibrate strongly or scream, load with noise or position error.

Handling method: confirm the servo drive PN 1 parameter whether match with the connected motor, set correct parameter based on table 7.2, then restore to factory value.

For example: the current motor is 60ST-M01330

1）check table 7.1, motor ID =1

2）operate drive, set PN0 to 0

3）set PN1 to motor ID number, that is PN1=1

4）operate drive and enter SN-DEF interface, press the ENTER key on the display panel for 2 seconds, when display DONE, indicates success.

5）turn off and power on again, done.

2、The motor run positional accuracy and the required accuracy deviation is very large and regular

Handling method: Set position pulse electronic gear ratio correctly. This servo system default 10000 pulse rotate a circle. If the host computer requires 3000 pulse for motor to rotate a circle, need to set gear ratio to meet requirement.

It can be calculated by below format:

3000 *（PN9 / PN10）=10000

get PN9=10 PN10=3

Set gear ratio refer to section 4.3

3、drive input, output signal level reversed

1）Set parameter PN53 PN54 PN55 to set input/output suitable high level or low level so as to adapt to different input/output level requirement of the controller.

4、host computer pulse motor not running

Make sure PN4=0, check UN-12 monitoring value, if there is digital shows the drive received pulse, it indicates the control signal connection without problem. Please refer to method 1 to clear trouble. If display F 0.0, it indicates the drive do not received pulse. Please refer to method 2 to clear trouble. UN-12 display unit is KHZ, like display F150, it indicates the present drive received pulse frequency is 150KHZ.

Method:

Set below two parameters: PN95=1 PN4=3 in F2 model performs JOG function. If the motor can rotate, it indicates the motor, the motor power line, encoder wire connected correct, there is no problem.

Check CN1 signal if with INH signal or CLE signal with ON or not. It can be found by check UN-16.

If the motor can not run, please do following inspection

1）Check the drive with enable motor or not, and turn the motor shaft by hand. If it can not be rotated, indicates the motor enable locked. If it can be rotated, indicates there is no enable, please check if CN1 input enable signal correct connected or not. If the enable signal do not need to control by the host computer. CN1 input enable signal not connected, can set PN95=1, drive motor automatically enable locked.

2）Check if the power cable which between drive and motor connected correctly or not, and the socket loose or not. Drive output terminal U V W PE and motor U V W PE whether corresponding. Power cable U V W PE must be connected correctly, can not change the order randomly.

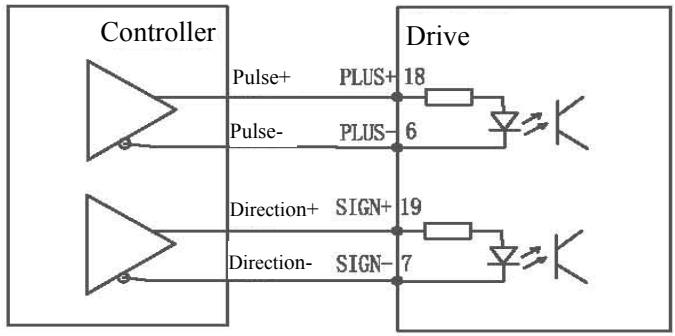
3）Please contact the factory technical personnel.

Method 2:

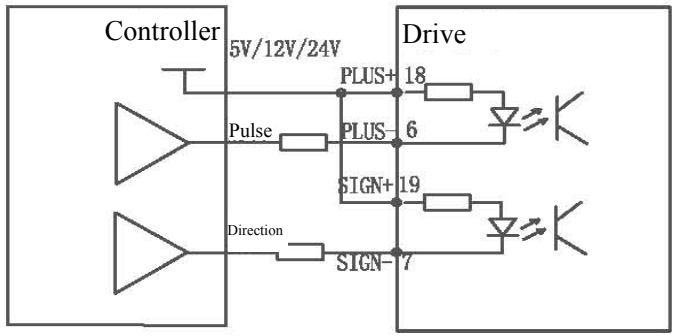
1）Check the pulse amplitude input to drive, the standard is 5V. If the pulse amplitude is 12V, must series 1K resistance; if the pulse amplitude is 24K, must series 2K resistance. The drive input circuit will be burned if not series resistance according to the requirements. Lead to the servo can not receive pulse.

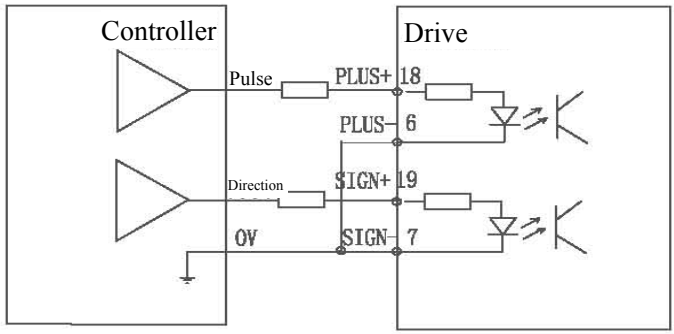
2）Confirm the pulse connection mode is correct, the connection mode: differential connection mode and single end connection mode. Specific see below chart

Typical application: NC system, motion controller



Typical application: PLC, SCP controller





5、The motor can only turn to one direction

1）Confirm the input to drive pulse type, pulse and direction setting PN8=0; double pulse setting PN8=1; A/B orthogonal pulse setting PN8=1, and confirm the drive model is SDxxx-D.

2）Observe UN-12 display state, host computer send corotation signal should display F xx. Reversal signal should display F －xx. If the host computer send corotation signal or reversal signal both display F xx or F –xx. Please check the direction signal SIGN from host computer to drive.

3）Please contact the factory technical personnel.

6、high speed stop or from top to down does negative work, the drive display AL－3

1）modify the host computer deceleration time

2）reduce motor speed

3）small power drive access external braking resistance

4）high power drive please contact the factory technical personnel.

7、there is no display when power on

1）Confirm power connecting line and input power

2）Please contact the factory technical personnel

8、Power on drive display “。。。。。。。。 ” or “888888”

1）the input power lack phase, check each phase power line

2）servo drive damaged by short circuit, and lead to servo drive damaged. The motor damage can be judged by motor shaft under the no-load situation, rotate a circle, if the shaft is not smooth, can be concluded that the motor is damaged.

9、Motor position is not accurate

1）disorder, check motor mechanical parts

2）orderly, monitor and analyse UN-02 UN-03 UN-04 UN-05 can get results

3）Screening interference, the signal wire use shield wire and grounding, add core. Motor cable change to shield wire. Electronic control system wiring again, and strong and weak electricity line separately. Install filter etc.

The effect of the servo monitoring menu in analysis and adjustment processes.

1）UN-01 motor speed observe the motor actual speed

2）UN-02 UN-03 motor current location: used to observe the current motor position, it is in the form of pulse number, like control the fixed trajectory. Each time run repeatedly, when go to the same position, the displayed value should be the same, which indicated each position is correct.

3）UN-04 UN-05 pulse instruction count, used to monitoring the pulse from the host computer whether correct.

For example, control to run the fixed trajectory, each time run repeatedly. When go to the same position, the displayed value should be the same, which indicates the pulse from host computer is correct.

4）UN-08 motor present torque, used to observe motor actual operate situation. If this value over 90 for a long time, the motor type is small.

5）UN-12 input pulse frequency, used to observe pulse frequency from host computer and stability state

6）UN-16 input signal state, used to judge whether the input signal is normal

7）UN-17 output signal state, used to judge whether the output signal is normal

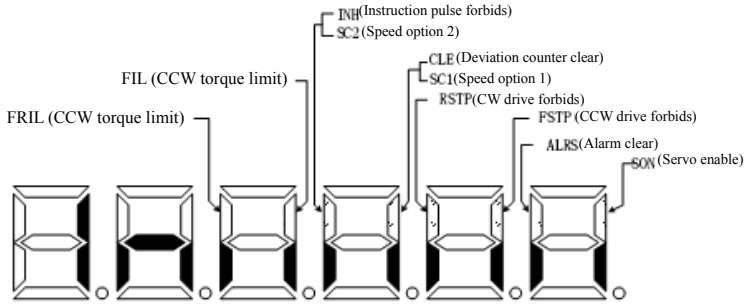


Chart 6.3 Input terminal display (light display ON, go out display OFF)

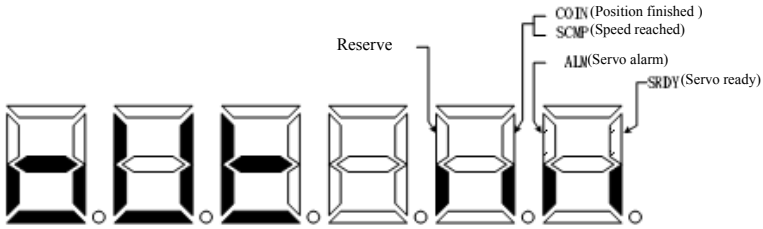


Chart 6.4 Output terminal display (light display ON, go out display OFF)

Appendix A: SD* series drive and ST servo matching parameter list

SD*series servo and ST motor matching and PN1 parameter (motor ID) setting

motor flange	motor power	motor model No.	servo drive model No.	ID No.
□60	200W	60ST-M00630	SD*08NK0	0
	400W	60ST-M01330		1
	600W	60ST-M01930		4
□80	400W	80ST-M01330		5
	750W	80ST-M02430		2
	730W	80ST-M03520		6
□90	750W	90ST-M02430		7
	730W	90ST-M03520		8
□80	1.0KW	80ST-M04025	SD*13NK3	3
□90	1.0KW	90ST-M04025		9
□110	600W	110ST-M02030		10
	1.2KW	110ST-M04030		11
	1.5KW	110ST-M05030		12
□130	1.0KW	130ST-M04025		15
	1.3KW	130ST-M05025		16
□110	1.2KW	110ST-M06020	SD*20NK3	13
	1.8KW	110ST-M06030		14
□130	1.5KW	130ST-M06025		17
	2.0KW	130ST-M07725		18
	1.0KW	130ST-M10010		20
	1.5KW	130ST-M10015		20
	2.5KW	130ST-M10025		21
	2.3KW	130ST-M15015		22
	3.8KW	130ST-M15025		23
	3.8KW	150ST-M15025		24

□150	3.0KW	150ST-M15020	SD*50NK5	25
	3.6KW	150ST-M18020		26
□150	4.7KW	150ST-M23020		27
				28
	2.7KW	180ST-M17215		29
	3.0KW	180ST-M19015	SD*50NK5	30
□180	4.5KW	180ST-M21520		31
	2.9KW	180ST-M27010		32
	4.3KW	180ST-M27015		32

In order to achieve the best control effect, the drive and motor must be matched to use (Pn1 motor ID matched to corresponding model number). Otherwise, it may vibrate, scream, position error etc

matching method:1）change Pn0 to 0.

2）Set Pn1 to the needed motor ID value

3）enter SN-DEF menu, press "Enter" key for 2 seconds till display DONE

4）power off, power on again can work normally.

Appendix B: product after-sales service explanation

According to the correct using method to use, this product will have a long service life. If the using method is improper or the environmental severity exceeds the allowed range, this product will be failure. The standard warranty period for this product is 12 months. Due to improper use or failure after more than 12 months will be charge for maintenance. Please note the following items about repair service

1） Product labels are important documents for the maintenance, please do not tear, damage. Otherwise no warranty.

2） Warranty period of 12 months is from the date of purchase, if the purchase vouchers can’t be offered within the warranty period, the warranty period will be 13 months since the factory date on the label.

3） Maintenance service needed, please contact the agency or distributors.

4）Please pack well after the maintenance service so as to prevent damage again.

The following circumstances are out of warranty service.

*Because of improper use, like wrong power-line connection, non-professional dismounting, rebuild, water seepage, oil in etc damage caused by human factors.

*The damage caused by natural disasters, such as lightning, earthquake etc

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